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Adding corticosteroids to the pudendal nerve block for pudendal neuralgia: a randomised, double-blind, controlled trial

JJ Labat,[a] T Riant,[a,b] A Lassaux,[c] B Rioult,[b] B Rabischong,[d] M Khalfallah,[e] C Volteau,[f] A-M Leroi,[g] S Ploteau[a,h]

[a] Federative Centre of Pelvi-Perineology, CHU Nantes, Nantes, France [b] Pain Unit, Centre Catherine de Sienne, Nantes, France [c] Pain Clinic, Hôpital Rothschild, Paris, France [d] Gynaecology Department, Polyclinique Hôtel-Dieu, Clermont-Ferrand, France [e] Centre Hospitalier de la Cote Basque, Bayonne, France [f] DRCI, Hôtel Dieu, Nantes, France [g] Digestive Physiology Department, Hôpital Charles Nicolle, Rouen, France [h] Gynaecology Department, Hôtel-Dieu, Nantes, France

Correspondence: Dr JJ Labat, Federative Center of Pelvi-Perineology, CHU Nantes, 1 Place A Ricordeau 44093 Nantes Cédex, France. Email jjlabat@gmail.com

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Objective To compare the effect of corticosteroids combined with local anaesthetic versus local anaesthetic alone during infiltrations of the pudendal nerve for pudendal nerve entrapment.

Design Randomised, double-blind, controlled trial.

Setting Multicentre study.

Population 201 patients were included in the study, with a subgroup of 122 women.

Methods CT-guided pudendal nerve infiltrations were performed in the sacrospinous ligament and Alcock's canal. There were three study arms: patients in Arm A (n = 68) had local anaesthetic alone, those in Arm B (n = 66) had local anaesthetic plus corticosteroid and those in Arm C (n = 67) local anaesthetic plus corticosteroid with a large volume of normal saline.

Main outcome measures The primary end-point was the pain intensity score at 3 months. Patients were regarded as responders (at least a 30-point improvement on a 100-point visual analogue scale of mean maximum pain over a 2-week period) or nonresponders.

Results Three months' postinfiltration, 11.8% of patients in the local anaesthetic only arm (Arm A) were responders versus 14.3% in the local anaesthetic plus corticosteroid arms (Arms B and C). This difference was not statistically significant (P = 0.62). No statistically significant difference was observed in the female subgroup between Arm A and Arms B and C (P = 0.09). No significant difference was detected for the various pain assessment procedures, functional criteria or quality-of-life criteria.

Conclusions Corticosteroids provide no additional therapeutic benefits compared with local anaesthetic and should therefore no longer be used.

Keywords Chronic pain, corticosteroid infiltrations, nerve block, pelvic pain, perineal pain, pudendal neuralgia.

Tweetable abstract Steroid infiltrations do not improve the results of local anaesthetic infiltrations in pudendal neuralgia.

Linked article This article is commented on by FF Tu, p. 261 in this issue. To view this mini commentary visit http://dx.doi.org/10.1111/1471-0528.14394.

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Introduction

Pudendal neuralgia (PN) is a devastating condition and its management is often not evidence-based. PN is defined by burning vaginal or vulval pain (anywhere between the anus and the clitoris) associated with tenderness over the course of the pudendal nerve.[1] PN due to pudendal nerve entrapment (PNE) is related to loss of mobility of the pudendal nerve over its gluteal or pelvic course. This loss of mobility is due to anatomical impingement[2] in various sites: in the reflection of the obturator fascia (Alcock's, or pudendal, canal), in the space between the sacrospinous ligament (SSL) and the sacrotuberous ligament (STL) or in the infrapiriformis

Registration name The study has been registered in the European Clinical Trial Registry: EudraCT no. 2008-003914-87 (registered 21 October 2008) and in the International Clinical Trial Registry Platform under no. NCT 00851513 (registered 25 February 2009) (https://clinicaltrials.gov/ct2/show/study/NCT00851513?term=pudendal+neuralgia&rank=1).

canal. The loss of mobility induces compression of the pudendal nerve against the falciform process of the STL while sitting. As in all canal syndromes, these anatomical structures are also present in asymptomatic patients. Onset of pain and the range of symptoms can involve other elements related to central sensitisation phenomena or muscular or visceral reactions/reflexes.

Five essential criteria (the Nantes criteria) have been proposed for the diagnosis of PN due to PNE:[3] (1) pain in the anatomical region innervated by the pudendal nerve, (2) pain that is worse while sitting, (3) pain that does not wake the patient at night, (4) no sensory deficit on examination, and (5) relief of symptoms by anaesthetic pudendal block.

No published study has evaluated the prevalence or incidence of PNE. This pain is observed in both men and women, but with a female predominance (60%). It is often misdiagnosed, but is now listed in classifications of female pelvic floor dysfunction.[4]

The treatment of PNE is primarily symptomatic: neuropathic pain medications, transcutaneous neurostimulation, physiotherapy, body psychotherapy, hypnosis. Anaesthetic blocks of the pudendal nerve are necessary to confirm the diagnosis. A greater than 50% reduction in pain while sitting immediately after infiltration confirms the role of the pudendal nerve. Corticosteroids are usually injected at the time of the anaesthetic nerve block with the therapeutic objective,[5] as in all forms of nerve entrapment syndromes, of treating a possible inflammatory component. However, this technique has never been validated by a controlled trial.

Pudendal nerve decompression surgery is recommended after failure of medical treatment. It is the only treatment that has been validated by a randomised, controlled trial.[6]

The primary objective of this study was therefore to assess the contribution of corticosteroids to local anaesthetic infiltration of the pudendal nerve. In other words: does the addition of corticosteroids to the anaesthetic block improve the therapeutic result on pain?

Method

The study was approved by Ouest III Ethics Committee (Poitiers University Hospital) (reference 08.10.24; Afssaps reference A80938-22). Informed consent was obtained from each participant.

Study design

This was a multicentre, prospective, randomised, double-blind, controlled, parallel-group study comparing the efficacy of three types of pudendal nerve infiltration for the treatment of PNE (Table 1). Injections were routinely performed in both the SSL and Alcock's canal (bilaterally on 70%) or on one side only when pain was strictly unilateral (30%). In each of the three arms of the study, patients received the same dose of local anaesthetic (40 mg) on each side. Arm A (1% lidocaine only, procedure A) served as the control arm. Patients in Arm B first received procedure A followed by injection of corticosteroids (20 mg of methylprednisolone per site, procedure B). Patients in Arm C received the same procedure as in Arm B (i.e. procedure A plus 20 mg of methylprednisolone) together with a large volume of normal saline (procedure C). This arm was designed to study any potential volume effect of the infiltration ('hydrodissection'). All patients therefore received the same anaesthetic block at the ischial spine and in Alcock's canal, and the same dose of contrast medium. Patients in Arms A and B received the same volumes, and patients in Arms B and C received the same dose of corticosteroids but different volumes.

Table 1. Infiltration procedure in each study arm

	Arm A (lidocaine)	Arm B (lidocaine + corticosteroids)	Arm C (lidocaine + corticosteroids + hydrodissection)
SSL			
Lidocaine 1 g/100 ml	4 ml of 1% solution = 40 mg	4 ml of 1% solution = 40 mg	4 ml of 1% solution = 40 mg
Methylprednisolone 40 mg/ml		0.5 ml = 20 mg	0.5 ml = 20 mg
Normal saline			4 ml
Contrast medium (Omnipaque 240)	0.25 ml	0.25 ml	0.25 ml
Total volume	4.25 ml	4.75 ml	8.75 ml
Alcock's canal			
Lidocaine	4 ml of 1% solution = 40 mg	4 ml of 1% solution = 40 mg	4 ml of 1% solution = 40 mg
Methylprednisolone 40 mg/ml		0.5 ml = 20 mg	0.5 ml = 20 mg
Normal saline			30 ml
Contrast medium	0.25 ml	0.25 ml	0.25 ml
Total volume	4.25 ml	4.75 ml	34.75 ml

SSL, sacrospinous ligament.

The protocol did not compare the effect of corticosteroids versus normal saline alone. this was because in order to ensure patient blinding, local anaesthetics had to be injected in all three trial arms so that all patients experienced a sensation of anaesthesia.

Participants

Patients had to present PNE according to the first four Nantes criteria[3] described above (Table 2). These criteria are purely clinical and define a homogeneous population. The fifth criterion (positive anaesthetic block of the pudendal nerve) is intrinsic to the study and was specifically examined. Patients had to have a mean maximum daily visual analogue scale (VAS) pain score of greater than or equal to 4/10, recorded over at least 5 days, and no major depression (Beck score <16/39). Data were collected by the Nantes University Hospital clinical research department.

Procedures

Description

In all centres, infiltrations were guided by CT scan with injection of contrast medium into the SSL and obturator fascia (Alcock's canal) on the side of the pain, or on both sides in patients with bilateral pain:

Table 2. Enrolment criteria

Patients presenting with the four essential clinical criteria for the diagnosis of PN based on the Nantes criteria[3]
1. Pain situated in the territory of the pudendal nerve (from the anus to the penis or clitoris)
2. Pain predominantly experienced while sitting
3. Pain that generally does not wake the patient at night
4. No objective sensory deficiency
. . .**and not meeting the exclusion criteria**
1. Exclusively coccygeal, gluteal or hypogastric pain
2. Exclusively paroxysmal pain
3. Associated with predominant pruritus
4. Presence of imaging abnormalities able to explain the symptoms
Patients also had to present the following characteristics :
Either gender over 18 years of age, experiencing pain for more than 6 months
Have never received an infiltration strictly identical (site and side) to that proposed in the context of the protocol and as defined in the methodology
Have no history of previous pudendal nerve surgery
Have given their informed consent to the protocol
Are covered by national health insurance
Are deemed to be able to fill in the proposed self-administered questionnaires
Are not taking part in any other clinical research protocol for the duration of the protocol (from D15 to D90)
Have no contraindications to injections of lidocaine, methylprednisolone or iodinated contrast medium

1 Infiltration of the SSL (see Figure S1). The patient was placed in the ventral decubitus position and the horizontal section with the largest sciatic spines was identified (in order to visualise the medial extremity of the sciatic spine). The SSL was identified and the needle was inserted into the medial half of this ligament. A test injection of local anaesthetic and contrast medium was then performed to confirm correct positioning of the needle and satisfactory diffusion of the contrast medium around the SSL to form an oblique biconvex 'lens' shape (with the patient in the ventral decubitus position).
2 Infiltration of Alcock's canal (Figure S2). The patient was placed in the ventral decubitus position, the obturator foramina were identified and a CT section was obtained through the centre of the obturator foramina. The obturator internus muscle and its reflection pulley were identified on this CT section. The needle was then inserted into the superior and most medial part of the obturator internus muscle. A test dose of contrast medium was then injected to verify diffusion, outlining the medial border of the pelvic part of the obturator internus muscle.

In both cases patients were placed in a ventral decubitus position and were unable to see the injection procedure. This method was therefore standardised in all centres and the quality of diffusion of contrast medium was assessed on CT images.

Primary end-point

Patients were classified into two groups: improved (Success) and not improved. The primary end-point was reduction in pain intensity assessed by the mean maximum score on the VAS pain scale at zero and 90 days after infiltration (D0 and D90, respectively). This end-point was based on the mean daily maximum pain intensity score during the 2 weeks before day (D)0 and D90. An infiltration inducing an improvement of more than 30 of 100 points (absolute value) or more than 50% improvement of the initial pain (relative value, more suitable for milder pain) was considered to be effective.

The study comprised a screening visit, an inclusion visit (D0) and a final assessment visit (D90). Patients had to fill in assessment diaries consisting of self-administered questionnaires during the 2 weeks before D0, D30, D60 and D90. Ten telephone reminders were performed to optimise completion of these diaries.

Secondary end-points

The secondary objectives were:

1 to determine whether the use of a large volume of normal saline to perform local hydrodissection improves the results (comparison between all three arms)

2 to evaluate the course of pain at intermediate time-points during the 2 weeks prior to D30 and D60 in the three arms
3 to evaluate the results as a function of the initial pain intensity (VAS <50, 50> VAS <70, VAS >70)
4 to evaluate changes in various parameters concerning the impact on quality of life
5 to evaluate the results as a function of a positive or negative pudendal nerve anaesthetic block.

Pain assessment

1 Other criteria were also used to define responders: relative improvement (30% improvement in the initial pain); improvement of 20/100 points (absolute value).
2 Patient's global impression of improvement (markedly improved, improved, unchanged, impaired, markedly impaired).
3 Efficacy of the anaesthetic block. This is based on assessment of pain on a scale from 0 to 100 while sitting for a sufficient time to reproduce the usual pain (a mean of 15 minutes but with a standard deviation of 30 minutes) immediately prior to infiltration and immediately after infiltration (5, 10, 15, 30, 60 minutes). The anaesthetic block was considered to be positive when a pain reduction of greater than 50% was observed immediately postinfiltration.
4 Impact of pain. PN is a specific type of pain with an impact on various parameters that were evaluated by scores (not validated), and compared between zero and 90 days after infiltration (D0 and D90). These data were collected by self-administered questionnaires:
   a difficulty in remaining seated: time to onset of pain, maximum duration in sitting position in minutes
   b impact on sex life (assessment of impaired quality of sex life scored from 0 to 100)
   c global quality of life (global assessment of quality of life using a 100-point VAS; pain-related restriction or discomfort rated by a 100-point VAS).

Randomisation and blinding

The protocol included an evaluation period, an enrolment and randomisation phase during which CT-guided infiltration was performed, a follow-up phase at 1 and 2 months (self-administered questionnaires and telephone calls) and a final evaluation at 3 months.

Randomisation was performed by the 'injector' doctor on the morning of the infiltration (D0). Patients were randomised in a 1:1:1 ratio by method of minimisation and stratified according to age (<50 years, 50–70 years, >70 years). Randomisation was performed electronically using TENALEA software. The randomisation arm and patient number were attributed automatically and confirmed by reception of an e-mail by the 'injector' doctor. The 'evaluator' doctor, who was always different from the 'injector' doctor, was blinded to the solution injected and was only informed of the patient's number and date of randomisation.

In all, 279 patients were screened and 201 were enrolled and received infiltration during the study (Figure S3). The 201 patients undergoing infiltration were recruited from six French centres (with seven 'injector' doctors).

Sample size determination and statistical analysis

Sample size

The main comparison was Arm A versus Arms B and C combined. The response rate was assumed to be 10% in the control arm (Arm A), 25% in Arm B and 40% in Arm C. The sample size needed to detect a difference of about 22.5% (10 versus 32.5%) between Arm A and Arms B and C combined, with a power of 80% and a Type I error of 5%, was 120 patients (40 patients in each study arm).

To address the secondary objectives (the hydrodissection effect), the number of subjects required was calculated based on comparisons between each of the three arms. The total number of patients required to obtain 80% power and a 5% overall bilateral Type I risk was 201, i.e. 67 patients per arm.[7]

Analysis of the primary end-point

The response rate between D0 and D90 was compared between Arm A and Arms B and C using a Mantel–Haenszel chi-square test to account for age stratification.

Patients requiring a second infiltration before D90 were considered to be failures, as were patients who completed less than half of their VAS diary at D0 or at D90 (i.e. a total of 23 patients).

Analysis of secondary end-points

1 Hydrodissection effect: the response rate between D0 and D90 was compared between Arms B and C and between Arms A and C using a Mantel–Haenszel chi-square test. An effect of hydrodissection would be demonstrated if a difference is demonstrated between arms B and C.
2 Efficacy of infiltration over time: the course of VAS scores and patients' global assessments over time were analysed using linear mixed models ('patient' was considered to be a random factor).
3 The impact of infiltration on quality of life was evaluated by analysis of the general question on restriction on quality of life 3 months' postinfiltration; between-arm comparison was by analysis of variance (ANOVA).
4 The course of the symptoms between D0 and D90. Analysis of the course of the various measurements and comparison between the three arms was done with linear

mixed models. Symptoms between D0 and D90 (maximum sitting duration, time to onset of pain while sitting, quality of sex life, pain-related discomfort or restriction and impairment of quality of life) were compared between the three arms using a nonparametric Van Elteren test.

5 Comparison of the response to treatment between patients with a positive diagnostic block and those with a negative block was by chi-square and analysis of variance (ANOVA) tests, with linear and logistic models used to account for treatment arms. Subgroup analyses compared the response rate at D90 in men and women and (see Table 4) and in the three age groups (strata). Subgroup analyses were also used to describe the course of the VAS score between D0 and D90 in the three arms.

6 Additional analyses: description of events occurring during infiltration or during the immediate postinfiltration period in each arm, description of the result of the diagnostic block (VAS immediately before and immediately after the block).

Analysis of secondary end-points initially consisted of global comparison of the three arms, followed by two-by-two comparison when the global test was significant ($P < 0.05$). Estimates are described with 95% confidence intervals. Statistical tests were two-sided. Statistical analyses were performed using SAS® version 9.3 software.

Results

The first patient was enrolled on 28 November 2008 and the last visit of the subjects enrolled in the study was on 27 February 2012; this was considered to be the study end date. Patients were enrolled in six French centres: Nantes, Paris, Clermont-Ferrand, Bayonne, Rouen and Lyon. Ninety-one percent of patients completed the protocol. Nine percent of patients dropped out of the study and were considered to be failures. A similar dropout rate was observed in each arm (Figure S3).

Baseline data: analysis of the study population

No significant difference in terms of clinical characteristics or clinical history was observed between the patients randomised to the three arms. The study population was described by data compiled during the screening visit and from the self-administered questionnaires (Table S1).

The mean age of patients was 57 years; 61% were women, 81% of the women were postmenopausal and 39% had had three or more children. Pain had been present for a median of 2 years prior to referral for pudendal nerve infiltration. Forty-three percent of patients (men and women) had a history of pelvic surgery.

Pain had a gradual onset in 63% of cases and a more sudden onset in 34% (including postoperative pain after all types of surgery not causing any direct injury to the pudendal nerve). Pain regularly became worse in 30% of patients, with phases of improvement and worsening in 31% of patients, and stable pain in 38% of patients. Pain was bilateral or midline in 70% of patients. It usually involved all of the perineum (62%). The anterior perineum was involved in 14% of patients and the posterior perineum alone in only 22% of patients.

Safety profile

All safety data demonstrated the satisfactory tolerability of infiltration (Table S2). All protocol-related adverse events were minor, known and expected. Severe and nonsevere adverse events associated with the disease or its treatment were also commonly observed in patients and were not increased according to the treatment arm. The only adverse event directly related to treatment was increased pain in 21% of patients; this was observed with a similar frequency in all treatment arms, suggesting that it was due to the injection itself rather than the substances injected. This increased pain was only temporary in 50% of cases. Pain was more intense at the end of the protocol than at enrolment in 15% of patients but this can be attributed to the natural course of neuralgia, which frequently worsens over time (30% of patients were regularly deteriorating prior to infiltration; see Table S1).

Results: primary end-point

Three months' postinfiltration, 27/201 patients (13.43%) experienced an improved pain score of greater than 30/100 points (mean maximum daily pain score during the 2 weeks before the D90 visit). However, 8/68 (11.8%) of patients in the control group (Arm A, local anaesthetic only) versus 19/114 (14.3%) of patients of Arms B and C combined (local anaesthetic and corticosteroid) experienced an improved pain score of greater than 30/100 points (Table S3). This difference was not statistically significant ($P = 0.62$). At 3 months' postinfiltration, therefore, corticosteroids did not provide any additional therapeutic benefit compared with local anaesthetics injected into the region of the pudendal nerve.

Results: secondary end-points

Comparison of the arms with and without corticosteroids (arm A versus arms B and C)

The absence of an effect of corticosteroids was confirmed by comparing secondary end-points between Arm A (lidocaine) and Arms B and C (lidocaine + corticosteroids) (Table S3).

A responding patient was defined according to different criteria:

1 Greater than 20-point improvement instead of 30 points (primary end-point) in the pain score. Using this criterion, 19% of patients were considered to be responders, but with no difference between the arms with or without corticosteroids.
2 At least 30% improvement in baseline pain intensity 3 months' postinfiltration. Using this criterion 26% of patients were considered to be responders, but with no difference between the arms (28% with local anaesthetic only).

The mean improvement of baseline pain score was 6/100 with no difference between the arms.

Comparison of the three arms. No significant difference was observed between the three arms according to the infiltration technique used; the addition of a large volume of normal saline did not modify the results (Tables 3 and 4).

No significant difference between the three arms was observed for any of the other parameters. No depletion of a potential initial effect was observed (no difference at 1, 2 or 3 months). No significant difference was observed according to the baseline pain intensity. No significant difference in the course of functional parameters (quality of sitting, sex life, pain-related restriction, quality of life) was observed between the three arms. As part of a comprehensive self-assessment, 36% of patients reported improvement after infiltration with no difference between the three arms. The time course at D30, D60 and D90 did not reveal any differences between the three arms (Table S4)

Result of the anaesthetic block

The anaesthetic block was positive (greater than 50% reduction of pain immediately postinfiltration) in 82% of patients with a mean pain reduction of 62%, with no significant differences between the three arms. The success rate was not significantly different according to whether the anaesthetic block was positive or negative in the three arms (Table 4).

Age and gender and duration of pain

No significant difference was observed between age subgroups. No difference was observed between the male and female subgroups: 2/41 (4.6%) women in Arm A were responders versus 12/81 (14.8%) of the women in Arms B and C ($P = 0.09$; descriptive exploratory analysis was performed on this parameter). No difference was observed between subgroups according to the duration of pain (Table S5).

Discussion

This study is the first prospective, randomised, blinded study designed to assess, at 3 months, the efficacy of

Table 3. Results for the secondary end-points in the three arms (1) (minimum–maximum)

If improvement ≥30 points (D0 vs. D90)		Arm A (*n* = 68)	Arm B (*n* = 66)	Arm C (*n* = 67)	Total (*n* = 201)	*P*-value
Total	SUCCESS	8/68 (11.8%) [5.2%; 11.8%]	8/66 (12.1%) [5.4%; 22.5%]	11/67 (16.4%) [8.5%; 27.5%]	27/201 (13.4%) [9.0%; 18.9%]	0.68
Males	SUCCESS	6/27 (22.2%) [8.6%; 42.3%]	3 /27 (11.1%) [2.4%; 29.2%]	4/23 (17.4%) 5.0%; 38.8%]	13/77 (16.9%) [9.3%; 27.1%]	0.91
Females	SUCCESS	2/41(4.9%) [0.6%; 16.5%]	5/38 (13.2%) [4.4%; 28.1%]	7/43 (16.3%) [6.8%; 30.7%]	14/122 (11.5%) [6.4%; 18.5%]	0.21
If improvement ≥30% (D0 vs. D90)	SUCCESS	19/68 (27.9%) [17.7%; 40.2%]	13/66 (19.7%) [10.9%; 31.3%]	20/67 (29.8%) [19.3%; 42.3%]	52/201 (25.9%) [20.0%; 32.5%]	0.37
If improvement ≥20 points (D0 vs. D90)						
Total	SUCCESS	13/68 (19.1%) [10.6%; 30.5%]	11/66 (16.7%) [8.6%; 27.9%]	15/67 (22.4%) [13.1%; 34.2%]	39/201 (19.4%) [14.2%; 25.6%]	0.71
Patient's global assessment on D90	Markedly improved	3 (5%)	2 (3%)	3 (5%)	8 (4%)	
	Improved	22 (36%)	14 (23%)	22 (35%)	58 (31%)	
	Unchanged	25 (41%)	38 (61%)	28 (45%)	91 (49%)	
	Impaired	8 (13%)	8 (13%)	7 (11%)	23 (12%)	
	Very impaired	3 (5%)	0 (0%)	2 (3%)	5 (3%)	
	Missing data	7	4	5	16	
Global assessment on D90 in two groups	Not improved	36 (59%)	46 (74%)	37 (60%)	119 (64%)	0.14
	Improved	25 (40.9%) [28.9%; 54.3%]	16 (25.8%) [15.5%; 38.5%]	25 (40.3%) [28.1%; 53.6%]	66 (35.7%) [28.8%; 43.0%]	
	Missing data	7	4	5	16	

Table 4. Results for the secondary end-points in the three study arms (2)

	Arm A	Arm B	Arm C	Total	
Results at 1 month (D30)					
SUCCESS	10 (15.1%) [7.5–26.1%]	9 (14.3%) [6.8–25.4%]	12 (18.5%) [9.9–30.0%]	31 (16.0%) [11.1–21.9%]	
Missing data	1	1	1	3	
Results at 2 months (D60)					
SUCCESS	10 (15.4%) [7.6–26.5%]	8 (13.1%) [5.8–24.2%]	13 (20.0%) [11.1–31.8%]	31 (16.2%) [11.3–22.2%]	
Missing data	1	1	1	3	
Baseline VAS <50	*n* = 15	*n* = 11	*n* = 14	*n* = 40	
% change in VAS between D0 and D90					
Mean	−35.2 (σ = 55.2)	1.8 (σ = 45.5)	−28.5 (σ = 27.3)	−22.7 (σ = 46.0)	
Min.–Max.	[−65.8 to −4.6]	[−28.8 to 32.3]	[27.3–44.3]	[−37.4 to −8.0]	
Baseline VAS ≥50 and <70	*n* = 23	*n* = 28	*n* = 30	*n* = 81	
% change in VAS between D0 and D90					
Mean	1.2 (σ = 33.8)	−14.6 (σ = 29.4)	−19.4 (σ = 34.6)	−12.6 (σ = 33.1)	
Min.–Max.	[−15.8 to 13.4]	[−26.0 to −3.2]	[−32.3 to −6.5]	[−19.9 to −5.3]	
Baseline VAS ≥70	*n* = 22	*n* = 23	*n* = 17	*n* = 62	
% change in VAS between D0 and D90					
Mean	−2.7 (σ = 21.3)	−9.3 (σ = 22.7)	−10.3 (σ = 36.9)	−7.2 (σ = 26.7)	
Min.–Max.	[−12.1 to 6.8]	[−19.1 to 0.5]	[−29.3 to 8.7]	[−14.0 to −0.5]	
Differences between D0 and D90	***N* = 68**				***P*-value**
Maximum sitting duration					
n	52	51	56	159	*P* = 0.99
Improvement in minutes					
Mean	−12.5 (σ = 52.4)	−1.0 (σ = 40.2)	−1.5 (σ = 77.8)	−4.9 (σ = 59.4)	
Min.–Max.	[−27.1 to 2.1]	[−12.3 to 10.3]	[−22.3 to 19.3]	[−14.2 to 4.4]	
Median	0.00	0.00	0.00	0.00	
Q1–Q3	[−15.00; 5.00]	[−14.00; 5.00]	[−15.00; 6.00]	[−15.00; 5.00]	
Time to onset of pain while sitting					
n	54	51	53	158	*P* = 0.62
In minutes					
Mean	−2.9 (σ = 43.5)	−5.3 (σ = 28.9)	−16.1 (σ = 85.4)	−8.1 (σ = 57.9)	
Min.–Max.	[−14.8 to 9.0]	[−13.4 to 2.8]	[−39.7 to 7.4]	[−17.2 to 1.0]	
Median	0.00	0.00	0.00	0.00	
Q1–Q3	[−3.00; 5.00]	[−5.00; 4.00]	[−5.00; 10.00]	[−5.00; 5.00]	
Quality of sex life					
n	51	50	50	151	*P* = 0.57
Improvement from 0 to 100					
Mean	5.0 (σ = 29.8)	−1.5 (σ = 28.2)	3.5 (σ = 30.5)	2.3 (σ = 29.4)	
Min.–Max.	[−3.4 to 13.3]	[−9.5 to 6.5]	[−5.2 to 12.1]	[−2.4 to 7.1]	
Median	1.00	0.00	0.50	0.00	
Q1–Q3	[−7.00; 19.00]	[−8.00; 8.00]	[−7.00; 9.00]	[−7.00; 13.00]	
Pain-related discomfort or restriction					
n	59	54	55	168	*P* = 0.93
Improvement from 0 to 100					
Mean	9.0 (σ = 26.6)	6.7 (σ = 24.7)	9.2 (σ = 31.7)	8.3 (σ = 27.7)	
Min.–Max.	[2.0–15.9]	[−0.1 to 13.4]	[0.7–17.8]	[4.1–12.5]	
Median	7.00	3.00	7.00	6.50	

Table 4. (Continued)

	Arm A	Arm B	Arm C	Total	
Q1–Q3	[−6.00; 23.00]	[−7.00; 22.00]	[−11.00; 28.00]	[−8.00; 23.50]	
Impairment of quality of life					
n	57	47	56	160	$P = 0.74$
Improvement from 0 to 100					
Mean	8.6 ($\sigma = 24.3$)	3.6 ($\sigma = 25.1$)	6.4 ($\sigma = 30.0$)	6.4 ($\sigma = 26.6$)	
Min.–Max.	[2.1–15.0]	[−3.8 to 11.0]	[−1.6 to 14.4]	[2.2–10.5]	
Median	9.00	6.00	3.00	6.00	
Q1–Q3	[−6.00; 24.00]	[−5.00; 16.00]	[−12.50; 21.00]	[−7.00; 21.50]	
Negative anaesthetic block (D90) 18%					
SUCCESS	5/14 (35.7%) [12.8–64.9%]	2/13 (15.4%) [1.9–45.5%]	0/9 (0.0%) [66.4–100%]	7/36 (19.4%) [8.2–36.0%]	$P = 0.23$
Positive anaesthetic block (D90) 82%					
SUCCESS	3/54 (5.6%) [1.2–15.4%]	6/52 (11.5%) [4.4–23.4%]	11/57 (19.3%) [10.1–31.9%]	20/163 (12.3%) [7.7–18.3%]	

corticosteroids for pudendal nerve infiltrations in patients exhibiting clinical signs suggestive of PNE and present for more than 6 months.

Main findings

Data published in the literature

The literature[8–13] includes several publications reporting favourable results of corticosteroid infiltration in pudendal neuralgia. The percentage of patients who showed improvement (based on rarely specified criteria) ranged from 15 to 78% (Table S6). The various series published to date comprised very small sample sizes with variable sites and numbers of infiltrations. In these cases, corticosteroids were always associated with local anaesthetics and none of these studies included a control arm. Only the study by Amarenco et al.[8] included a considerable sample size, and it demonstrated 15% improvement at 1 year. These results are similar to those of our study (11.8% of patients improved by 30/100 points and 26% had an improvement of more than 30% in their pain score), independently of whether corticosteroids were used. Spontaneous reduction in pain can be considered to have occurred in 15% of patients at 1 year.

Data from the present study

This study demonstrates that corticosteroid infiltration is no more effective than the use of local anaesthetics alone, regardless of the method used to assess pain. The use of corticosteroids is therefore unnecessary. The use of a large volume of normal saline also did not improve the result.

In the present study, the response rate for the overall sample was 13.4%, when response was defined by a 30-point improvement in pain score, and 26% when response was defined by a 30% improvement in baseline pain intensity. None of the other specific parameters of PN—lowest pain intensity, sitting duration, time to onset of pain when sitting, quality of sex life, pain-related discomfort or restriction, overall impairment of quality of life—were improved by the addition of corticosteroids. Pudendal nerve infiltrations, conducted according to the methodology of this protocol, were well tolerated.

Strengths and limitations

Limited action of corticosteroid infiltration in neuropathic pain

Corticosteroid infiltration for pain due to entrapment neuropathies is a very common procedure. Although this technique is performed routinely, few randomised trials have been conducted. A Cochrane study in 2007[14] identified only two good-quality randomised trials,[15,16] both comparing the efficacy of steroids versus placebo in carpal tunnel syndrome. The results demonstrated that steroid infiltrations were significantly effective at 1 month but not at subsequent follow up. Lumbosacral transforaminal epidural injections of corticosteroids have been demonstrated to be superior to placebo for the treatment of nerve root pain but have not been compared with local anaesthetic injections (Level A recommendation).[17]

The results of the present study support the idea that corticosteroids do not provide any benefit in addition to that of local anaesthetics in PNE. However, the results of our study also suggest that infiltrations for PN due to PNE are only moderately effective, as only 26% of patients experienced a greater than 30% reduction in their pain. In studies on the treatment of chronic pain, this improvement is usually considered to indicate clinical efficacy.[18] However, it is not clear if this improvement rate simply reflects a placebo effect or is

due to a specific effect of local anaesthesia. The present study was not designed to address this question. In practice, anaesthetic block is considered to be essential for the diagnosis of PN due to PNE and should therefore be performed. This procedure can also confirm the patient's complaint, thereby facilitating the treatment plan. No difference in efficacy was observed at 1 or 2 months between the various study arms, therefore excluding a transient effect that may have been depleted at 3 months.

Diagnostic benefit of local anaesthetic block

Anaesthetic blocks were considered to be positive in 82% of cases (greater than 50% reduction in pain postinfiltration), similar to the results reported by Vancaillie:[19] 87% of blocks conducted in 66 female patients with PN were positive. In the present study, the absence of any difference in efficacy according to whether the anaesthetic block was positive suggests a placebo effect. Anaesthetic block remains essential for treatment because surgery is not recommended when the block is negative (as it is in one out of five cases).

Interpretation, treatment strategy

The practice of adding corticosteroids to a nerve block is widespread and essentially based on a few studies showing that corticosteroids might prolong the effect of the local anaesthetic. In this study, addition of a corticosteroid had no long-term negative effects. The lack of superiority of corticosteroid infiltrations over local anaesthetics in patients with PN indicates that such injections are of little, if any, value. However, anaesthetic block infiltration remains essential to confirm the diagnosis and the written results should be given to the patient, as this information is subsequently essential for any proposed surgery. Based on our findings, anaesthetic infiltration enables 26% of patients to obtain a 30% reduction in their maximum pain intensity. In routine practice, anaesthetic block is typically associated with various medical treatments for neuropathic pain: medications, physiotherapy for associated myofascial pain in almost 50% of cases, transcutaneous neurostimulation, psychobehavioural techniques or short-term therapies (hypnosis etc.). Surgical decompression of the pudendal nerve via a transgluteal approach[20] was shown to be effective in a randomised protocol comparing surgery with no surgery.[6] Surgery may therefore be justified in patients with refractory pain and a positive anaesthetic block. Repeat infiltrations are unnecessary in this context. Surgery should preferably be considered fairly rapidly to limit the risk of hypersensitisation and ongoing phenomena of chronic pain syndrome.

Conclusion

This study is the first prospective, randomised, double-blind study designed to assess the efficacy of corticosteroid infiltrations of the pudendal nerve in patients presenting clinical signs suggestive of PNE that have been present for more than 6 months. In all, 201 patients (including 122 women) were enrolled. The present study shows that adding corticosteroids provides no advantage 3 months after nerve block. Identical results were observed in a women-only subgroup. The use of corticosteroids cannot be recommended. The treatment strategy should therefore comprise infiltration of local anaesthetics alone, without corticosteroids, and only in the sacrospinous ligament to confirm the diagnosis, with a greater than 30% reduction in pain in 26% of patients.

Disclosure of interests

None declared. Completed disclosure of interests form available to view online as supporting information.

Contribution to authorship

JJL participated in the study design, and contributed to recruitment and monitoring of patients, to the literature search, writing and editing, and to the tables. TR contributed to recruitment, infiltration and monitoring of patients and participated in CT scan images. AL, BRi, Bra, MK and AML contributed to recruitment, infiltration and monitoring of patients. SP contributed to the literature search, writing and editing, and to the drawing of the figures and tables. CV participated in study design, including the statistical analysis plan, and supervised statistical analysis.

Details of ethics approval

The study was approved by Ouest III Ethics Committee (Poitiers University Hospital) reference 08.10.24; Afssaps reference A80938-22. Informed consent was obtained from each participant.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Figure S1. Sacrospinous ligament infiltration. Left: needle tips in sacrospinous ligaments. Right: contrast medium moulding the sacrospinous ligaments.

Figure S2. Alcock's canal infiltration: Left: needle in position in the proximal part of Alcock's canal. Right: radio-opaque solution diffusing at the inner edge of the obturator internus muscle outlining Alcock's canal.

Figure S3. Consort flow diagram.

Table S1. Clinical data.

Table S2. Safety profile.

Table S3. VAS before infiltration and VAS 3 months after infiltration.

Table S4. Pain assessment over time.

Table S5. Results for the primary end-point for all patients and according to gender and age, and duration of pain.

Table S6. Published results.■

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